24-01-01

Cooling System

GROUP 24

PART 24-01 General Cooling System Service

1 TESTING

This part covers general cooling system service. For cooling system component removal, disassembly, assembly, installation and repair procedures and specifications, refer to the pertinent part of this group.

Part 24-02 lists the identification features of radiators; such as, fins per inch, width, depth (thickness) and height. The radiators are listed in relation to the car, engine, cooling requirement, and cooling fan size. The service part number denotes a replacement radiator.

To check the number of fins per inch, count the total number of fins across 4 inches and divide by the number of inches.

Refer to the Car Diagnosis Manual, Form FD 7962 for diagnosis procedures.

COOLING SYSTEM PRESSURE TEST

1. Shut the engine off. **To prevent loss of coolant and to avoid the danger of being burned, place a cloth over the cap and rotate the cap slowly counterclockwise to first stop and allow pressure to escape completely. Then turn cap again slowly counterclockwise to remove.**
2. After the cooling system pressure has been released, remove the radiator cap, wet the rubber sealing surface and reinstall cap tightly on the radiator.
3. Disconnect the electrical connector from the engine temperature sending unit and remove the temperature sending unit from the manifold.

With the radiator cap installed, only a small amount of coolant will be lost when the sending unit is removed.

4. Install an adapter fitting (3/8 N.P.T. male thread on one end, and a hose connection on the other end to accommodate the tester hose) tightly into the intake manifold or cylinder head in place of the sending unit.
5. Remove the radiator overflow hose from the retainer clips. Make sure the hose is firmly installed on the radiator overflow tube and is in good

condition. Insert the free end of the overflow hose into a container of water.

6. Attach the pressure pump and gauge to the adapter fitting and pressurize the cooling system until bubbles are observed in the water container. Discontinue pumping when bubbles appear.

When the bubbles cease, read the pressure gauge. The gauge reading is the pressure relief of the cap and should be within 10 to 16 psi. If the pressure reading exceeds the specified limit, replace the radiator cap.

7. If bubbles continue and the pressure drops below 10 psi, the radiator cap is not holding pressure. Release pressure and wash cap in clean water to dislodge any foreign matter from the valves. Check the rubber sealing surface of the cap and also the cap sealing surface in the radiator neck. Inspect the cam lock flanges on both sides of the filler neck for maximum cap engagement.

8. Recheck the cooling system as outlined in step 6. If the cap still does not hold pressure, the cap is damaged and must be replaced. Recheck system after a new cap is installed to assure that the system will now hold pressure.

9. If the bubbles in the water container cease and the radiator cap is within pressure specifications, observe gauge reading for approximately two minutes. Pressure should not drop during this time.

10. If pressure drops, check for leaks at the engine to heater core hoses, engine to radiator hoses, bypass hose, water valve hose (A/C equipped), thermostat housing gasket, etc. Any leaks which are found must be corrected and the system rechecked.

11. If the system holds pressure, remove the radiator cap to release the pressure then reinstall the cap.

12. Remove the adapter from the manifold or cylinder head and reinstall the temperature sending unit. Check coolant level and replenish if necessary with the correct coolant solution.

NOTE: Never exceed the rated pressure indicated on the pressure cap when performing the pressure test.

THERMOSTAT TEST—THERMOSTAT REMOVED

It is good practice to test new thermostats before installing them in the engine.

Remove the thermostat and immerse it in boiling water. Replace the thermostat if it does not open more than 1/4 inch.

If the problem being investigated is insufficient heat, the thermostat should be checked for leakage. This may be done by holding the thermostat up to the lighted background. Light leakage around the thermostat valve (thermostat at room temperature) indicates that the thermostat is unacceptable and should be replaced. It is possible, on some thermostats, that a slight leakage of light at one or two locations on the perimeter of the valve may be detected. This should be considered normal.

MINIMUM FAN DRIVE REQUIREMENT TEST

1. Spin the fan blade. A resistance should be felt. If there is no resistance or very high resistance, the oil in the clutch has been destroyed and the fan clutch must be replaced.

2. Using a suitable marker, mark the water pump pulley hub, one of the fan blade attaching bolts and the crankshaft pulley.

3. Connect a tachometer to the engine.

4. Install a throttle adjusting tool.

5. Connect a Sun Strobe Light. This can be a SLT-1 or SLT-2 Strobo-tach or a STA-1 Strobe Trigger adapter for the Sun Distributor Test Stand.

6. Start the engine and run it at approximately 1500 rpm until engine temperature has normalized.

7. Adjust the engine to the specified engine testing speed (Part 24-03).

8. Operate the Strobe Light at 2000 rpm and aim it at the water pump pulley. Adjust the engine speed until the light flashes and the water pump pulley mark are synchronized.

9. Aim the timing light at the fan blade attaching bolts. Adjust the Strobe Light until it is synchronized with the fan blade.

10. The fan speed must not be greater than the specified minimum fan test speed at 2000 water pump rpm.

11. Turn the engine off.

12. If the fan speed was greater than the specified minimum fan test speed, check for proper parts usage.

If the correct parts are used, replace the fan drive clutch.

If the part(s) are not the correct ones, replace the part(s) and perform the test again.

13. If the Maximum Fan Drive Requirement Test is going to be performed, do not remove the tachometer, Strobe Light or throttle adjusting tool.

14. If a Maximum Fan Drive Requirement Test is not going to be performed, remove the tachometer, Strobe Light and Throttle adjusting tool.

MAXIMUM FAN DRIVE REQUIREMENT TEST

1. If the Minimum Fan Drive Requirement Test was not performed, follow steps 1 thru 5 under Minimum Fan Drive Requirement Test.

2. Block off areas on each side of the core in the engine compartment and the front of the grille.

3. Place the air conditioning selector to the maximum position and the blower switch to the high position.

4. Adjust the Strobe Light to 2000 rpm.

5. Start the engine and adjust it until the water pump pulley is synchronized with the Strobe Light. This will be near the engine testing speed given in the specifications.

6. Turn off the air conditioning blower switch.

7. Synchronize the timing light with the marked fan to clutch attaching bolts.

8. The fan speed must meet or exceed the specified maximum fan test speed at 2000 water pump rpm.

9. If the fan speed was less than the specified maximum fan test speed, check for proper parts usage.

If the correct parts are used, replace the fan drive clutch.

If the part(s) are not the correct ones, replace the part(s) and perform the test again.

2 COMMON ADJUSTMENTS AND REPAIRS

ADJUSTMENTS

DRIVE BELTS

The fan drive belt(s) should be properly adjusted at all times. Loose drive belt(s) cause improper alternator, fan and water pump operation. A belt that is too tight places a severe strain on the water pump and the alternator bearings.

Properly tensioned drive belts minimize the noise and also prolong service life of the belt. Therefore, it is recommended that a belt tension gauge be used to check and adjust the belt tension. **Any belt that has operated for a minimum of 10 minutes is considered a used belt, and, when adjusted, it must be adjusted to the reset tension shown in the specification.**

Belt Tension

1. Install the belt tension tool on the drive belt (Fig. 1) and check the tension following the instructions of the tool manufacturer.
2. If adjustment is necessary, loosen the alternator mounting and adjusting arm bolts. Move the alternator toward or away from the engine until the correct tension is obtained. Remove the gauge. Tighten the alternator adjusting arm and mounting bolts. Install the tension gauge and check the belt tension.

REPAIRS

6-CYLINDER ENGINE COOLING FAN

Removal

Loosen the fan belt. Remove the capscrews and lock washers retaining the fan to the water pump hub. Remove the fan.

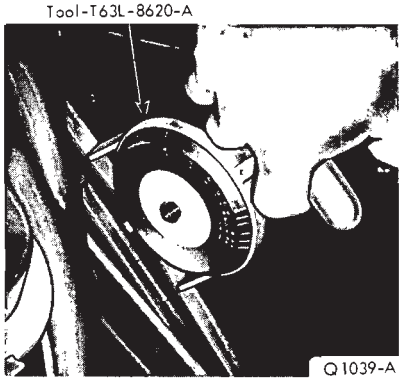

FIG. 1—Checking Drive Belt Tension

Installation

Position the fan on the water pump hub. Install the lock washers and capscrews and torque the capscrews to specifications. Adjust the fan belt tension to specifications.

V-8 ENGINE COOLING FAN

On a car with an air conditioner or extra-cooling radiator, a fan drive clutch may be used (see Specifications). Cars without air conditioning or equipped with Flex-Blade Fan utilize a pulley-to-fan spacer.

Removal

1. Remove the radiator upper support and fan guard. Loosen the fan belt. Remove the capscrews and lock washers retaining the fan and spacer (or drive clutch) to the water pump hub. Remove the fan and spacer (or drive clutch).
2. If equipped with a fan drive clutch, remove the retaining capscrews and lock washers and separate the fan from the drive coupling.

Installation

1. Position the replacement fan on the drive clutch and install the lock washers and capscrews. Torque the capscrews evenly and alternately to specifications.
2. Position the fan and spacer (or drive clutch) on the water pump hub and install the lock washers and capscrews. Torque the capscrews evenly and alternately to specifications. Adjust the fan belt tension to specifications. Then, check the fan drive clutch flange-to-water pump hub for proper mating. Install the radiator upper support and fan guard.

FAN DRIVE BELT

Removal

If equipped with power steering, air conditioning and/or Thermactor exhaust emission control system it will be necessary to loosen and remove the drive belts before the fan drive belt can be removed.

1. On a car with power steering (excepting Lincoln Continental), loosen the power steering pump at the mounting bracket and remove the drive belt.

On a car with an air conditioner, remove the compressor drive belt.

2. Loosen the alternator mounting and ajusting arm bolts. Move the alternator toward the engine. Remove the belt(s) from the alternator and crankshaft pulleys, and lift them over the fan.

Installation

1. Place the belt(s) over the fan. Insert the belt(s) in the water pump pulley, crankshaft pulley and alternator pulley grooves. Adjust the belt tension to specifications.
2. On a car with an air conditioner, install and adjust the compressor drive belt to specifications.
3. On a car with power steering (excepting Lincoln Continental), install the power steering pump drive belt and tighten the pump at the mounting bracket. Adjust the drive belt tension to specifications.

RADIATOR HOSE

Removal

Radiator hoses should be replaced as directed in the pertinent car Maintenance Schedule or whenever they become cracked, rotted or have a tendency to collapse.

Drain the radiator; then loosen the clamps at each end of the hose to be removed. Slide the hose off the radiator connection and the radiator supply tank connection (upper hose) or the water pump connection (lower hose).

Installation

Position the clamps at least 1/8 inch from each end of the hose. Coat the connection areas with an approved water-resistant sealer and slide the hose on the connections. **Make sure the clamps are beyond the bead and placed in the center of the clamping surface of the connections.** Tighten the clamps. Fill the radiator with the recommended permanent antifreeze and water mixture. Operate the engine for several minutes, then check

the hoses and connections for leaks.

THERMOSTAT

Removal

1. Drain the radiator so that the coolant level is below the thermostat.
2. Remove the coolant outlet housing retaining bolts. Pull the elbow away from the cylinder head or manifold sufficiently to provide access to the thermostat. Remove the thermostat and gasket.

Installation

Check the thermostat before installing it, following the procedure under **Thermostat Test,** Part 24-01, Section 1.

1. Clean the coolant outlet housing and cylinder head or manifold gasket surfaces. Coat a new gasket with water resistant sealer. Position the gasket on the cylinder head opening. **The gasket must be positioned on the cylinder head or the intake manifold, before the thermostat is installed.** To prevent incorrect installation of the thermostat, the water outlet casting on all engines contains a locking recess into which the thermostat is turned and locked. Install the thermostat with the bridge section (Fig. 2) in the outlet casting. Turn the thermostat clockwise to lock it in position on the flats cast into the outlet elbow.
2. Position the coolant outlet elbow against the cylinder head, or the intake manifold. Install and torque the retaining bolts to specifications.
3. Fill the cooling system with the recommended Permanent Anti-Freeze and water mixture. If equipped with a crossflow radiator, follow the special instructions in Part 24-02 regarding checking coolant level. Check for leaks and proper coolant level after the engine has reached normal operating temperatures.

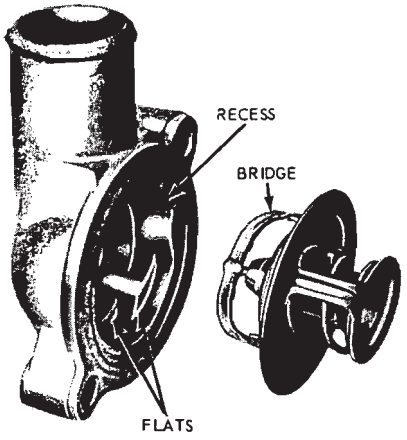

FIG. 2—Installing Thermostat—Typical

AUTOMATIC TRANSMISSION OIL COOLER

Replacement of the automatic transmission oil cooler in the radiator tank, as given below, is usually performed by radiator specialty shops on a sub-let basis. However, the operation can be performed in a dealer service department, providing proper equipment is available.

Removal

1. Drain the cooling system.
2. Remove the radiator from the vehicle, following the procedure given in Part 24-02.
3. Thoroughly clean the radiator assembly internally and externally by submerging in a tank filled with a caustic solution. Then, using clean water, flush until the caustic solution is removed from all internal and external surfaces.

NOTE: Caution should be exercised during the disassembly and assembly solder operation of radiator components. Avoid excess heat concentration which could result in burning through the radiator sheet metal or loosening an adjoining soldered area.

4. Loosen the supports connecting the affected tank to the core, if so equipped.
5. Remove the radiator tank containing the defective oil cooler.
6. Remove the puddled solder from the oil cooler inlet and outlet connections along with the internal tooth lockwashers retaining the connections to the tank.
7. Remove the defective oil cooler.
8. Clean the soldered surface areas and inspect and tin as necessary to assure proper solder bonding.

Installation

1. Install the replacement oil cooler assembly into the tank openings provided.
2. Make a new mechanical connection by installing new internal tooth lockwashers on the external inlet and outlet connections of the cooler (Fig. 3).
3. Seat the tank assembly in the seam well and solder securely, completely filling the seam well. Use 40-60 solder with either zinc chloride 30 (BAUME) or 5-B NALCO flux.
4. Resolder the supports in position.
5. Puddle-solder the oil cooler fittings completely to the tank.
6. Flush off all excess acid, internally and externally.
7. Pressure-test the radiator assem-

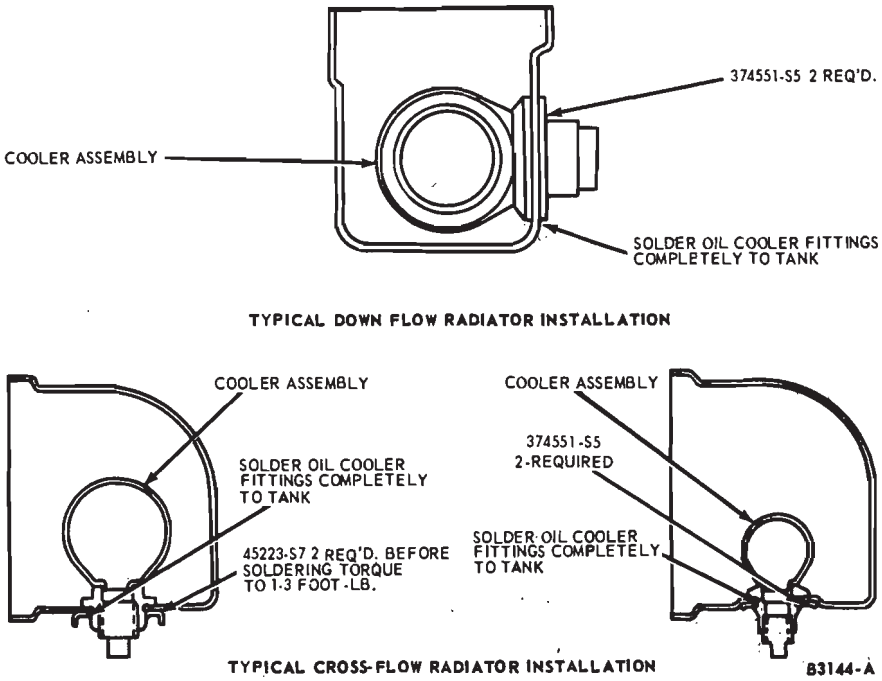

FIG. 3—Installing Oil Cooler

bly to 14-16 psi for leaks.

8. Paint as required.

9. Install the radiator in the vehicle. Install the straight hose nipple fittings or flare connectors in the oil cooler inlet and outlet connections and connect the transmission oil cooler lines.

10. Connect the radiator inlet and outlet connections.

11. Assemble the fan shroud to the radiator if so equipped.

12. Flush the cooling system and refill with the recommended mixture of Rotunda all season coolant.

NOTE: Only manufactured or natural gas torches should be used to perform radiator repairs. Do not use acetylene.

3 CLEANING AND INSPECTION

CLEANING COOLING SYSTEM

To remove rust, sludge and other foreign material from the cooling system, use Rotunda Cooling System Cleanser. Removal of such material restores cooling efficiency and avoids overheating.

Always remove the thermostat prior to pressure flushing.

A pulsating or reversed direction of flushing water flow will loosen sediment more quickly than a steady flow in the normal direction of coolant flow.

In severe cases where cleaning solvents will not properly clean the cooling system for efficient operation, it will be necessary to use the pressure flushing method.

Various types of flushing equipment are available.

4 SPECIFICATIONS

TORQUE VALUES (ALL CARS)

NOTE: All specifications are given in ft-lbs unless otherwise noted.			
Water Outlet Housing – All Engines	12-15	Radiator to Engine Hose Clamps	1.0-2.5
Fan and Spacer to Pulley Hub - All Engines	12-18	Radiator Inlet and Outlet Hose Clamps - All Engines	1.0-2.5
Radiator Brace Rod to Radiator Support Where Applicable	20-30 in-lbs	Fan Drive Clutch to Water Pump Hub	12-18

THERMOSTATS (ALL CARS)

LOW TEMPERATURE	
Opens °F	157°-164°
Fully Open	184°
HIGH TEMPERATURE	
Opens °F	188°-195°
Fully Open	212°

RADIATOR (ALL CARS)

Pressure Cap – All Engines	12-16 psi

SPECIAL SERVICE TOOLS (ALL CARS)

Description	Ford Tool No.	Former Tool No.
Belt Tension Gauge	T63L-8620-A	8620-A

DRIVE BELT TENSION (ALL CARS)

All Belts	Lbs.
New	140
Used (any belt operated over 10 minutes)	110

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1970 COOLING SYSTEM CAPACITY AND SUPPLEMENTAL PROTECTION–U.S. QUARTS ⑧

Vehicle	C.I.D. Engine	④Coolant Capacities		Coolant Concentrate Required ④			
				Basic	Supplemental-Drain & Add		
		Std.	Extra & A/C	-20° F	-30° F	-40 ° F	-50° F
Maverick, Falcon	170	9.2	9.2 ①	4.1	0.5	1.2	1.8
Falcon	200	9.0	9.0 ①	9.1	0.5	1.2	1.8
Mustang	200	9.0	9.0 ⑧	4.1	0.5	1.2	1.8
Maverick	200	9.0	9.0 ①	4.1	0.5	1.2	1.8
Mustang	250	9.8	9.8	4.4	0.5	1.3	2.0
Fairlane, Ranchero, Montego	250	11.4	11.4	5.1	0.6	1.5	2.3
Ford, Meteor	240	14.4	14.4 ⑧	6.5	0.8	1.9	2.9
Falcon	302	13.5	13.5 ⑧	6.1	0.7	1.8	2.7
Fairlane, Ranchero, Montego	302	15.4	15.4	6.8	0.8	2.5	3.3
Mustang	302	13.5		5.9	1.0	2.2	2.9
			15.0	6.6	1.1	2.4	3.2
Ford, Meteor	302	15.4	15.4 ⑧	6.8	1.1	2.5	3.3
			15.6 ①	6.9	1.1	2.5	3.3
Mustang	302 BOSS	15		6.6	1.1	2.4	3.2
Fairlane, Ranchero, Montego	351	15.6	15.6 ⑧	6.9	1.1	2.5	3.3
Mustang, Cougar	351	14.6		6.4	1.1	2.4	3.1
			16.1	7:1	1.2	2.6	3.4
Fairlane, Ranchero, Montego	429		19.5	8.6	1.4	3.1	4.2
		19.0		8.4	1.4	3.1	4.1
Ford, Meteor	351	16.5		7.3	1.3	2.7	3.5
Ford, Mercury, Meteor	390	20.0		8.9 9.2	1.4 1.2	3.2 3.5	4.2 4.6
			20.5 ①				
Fairlane, Montego, Ranchero	429 CJ	19.5		8.6	1.4	3.1	4.2
Ford, Mercury, Meteor	428	19.5	19.5 ①	8.6	1.4	3.1	4.2
Mustang, Cougar	428 CJ	19.3		8.5	1.4	3.1	4.1
Mustang	429 B.C.	18.5		8.2	1.3	3.0	4.0
Ford Mercury, Meteor	429	18.5		8.2 8.4	1.3 1.4	3.0 3.1	4.0 4.1
			19.0 ①				
Thunderbird	429	19.4	19.4 ①	8.7	1.1	2.6	3.8
Lincoln	460	19.5	19.5 ①	8.6	1.4	3.1	4.2
Mark III	460	19.4	19.4 ①	8.7	1.1	2.6	3.8

①A/C Only Air Conditioning Only
⑧X/C Only Extra Cooling Only

⑨ Multiply U.S. Quarts by 0.83 for equivalent Imperial Quarts.
④ Approxiamte

CQ1042-A

PART 24-02 Radiators

1 DESCRIPTION AND OPERATION

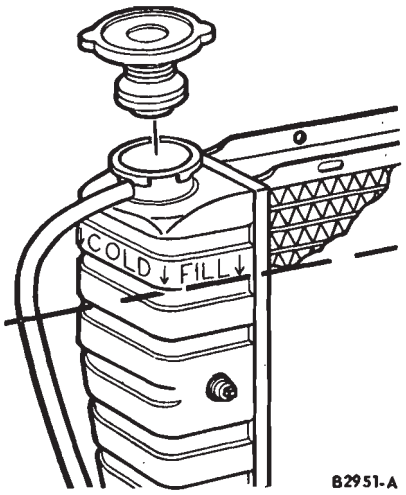

FIG. 1—Fill Level Crossflow Radiator

RADIATOR

Standard and extra-cooling radiators are installed in production, but service replacement radiators are usually of the extra cooling type. Refer to the radiator identification charts at the end of this part.

DOWN FLOW RADIATORS

These radiators are the tube and corrugated-fin-core type with the tubes arranged for vertical flow of the coolant. Two header tanks, one on the top and one on the bottom of the radiator, provide uniform distribution of the coolant to the tubes. The radiator outlet port (lower header tank) is connected to the water pump inlet port. The radiator inlet port (upper header tank) is connected to the coolant outlet housing of the engine, thereby permitting coolant circulation through the radiator when the thermostat is open. The radiator bottom header tank on automatic transmission cars contains a heat exchanger for cooling the transmission oil.

CROSSFLOW RADIATORS

These radiators are of the tube and corrugated-fin-core type with the tubes arranged horizontally for cross-flow of the coolant. Two header tanks, one on each side of the radiator, provide uniform distribution of the coolant to the cross-flow tubes. The header tank, or chamber, on the left side of the radiator contains a heat exchanger for cooling the transmission fluid. The radiator outlet port (lower left side) is connected to the water pump inlet port.

Special Filling Instructions

Coolant level cannot be accurately checked while the engine is running, due to the construction of this radiator. Check the level while the engine is cold and fill only to the cold fill reference mark stamped in the left side tank about two inches below the fill cap seat (Fig. 1).

2 REMOVAL AND INSTALLATION

RADIATOR

REMOVAL

1. Drain the cooling system. Disconnect the radiator upper and lower hoses from the radiator.

On a vehicle with an automatic transmission, disconnect the automatic transmission fluid cooler inlet and outlet lines from the radiator.

2. On a crossflow radiator, remove the radiator upper support retaining bolts and remove the upper support(s). Remove the radiator. If equipped with a downflow radiator, remove the radiator attaching bolts from the radiator side supports and remove the radiator.

On a vehicle equipped with an air conditioner, remove the bolts retaining the radiator shroud to the radiator. Remove the radiator upper or side retaining bolts. Remove the upper support retaining bolts, if so equipped. Remove the radiator. Lift the radiator shroud from the engine compartment.

INSTALLATION

1. If a new radiator is to be installed, remove the drain cock from the old radiator and install it on the new radiator.

On a vehicle equipped with an automatic transmission, transfer the fluid cooler line fittings to the new radiator, using oil-resistant sealer.

2. Position the radiator assembly and install (but do not tighten on a vehicle with an automatic transmis-

sion) the radiator support bolts.

On a vehicle with an automatic transmission, connect the automatic transmission fluid cooler lines; then tighten the radiator support bolts.

On a vehicle with an air conditioner, position the radiator assembly and install the support bolts. Tighten the support bolts and install the shroud to the radiator.

3. Connect the radiator upper and lower hoses. Close the drain cock. Fill and bleed the cooling system.

4. Operate the engine and check for leaks at the hose connections and the automatic transmission fluid cooler lines. Check the automatic transmission fluid level.

3 SPECIFICATIONS

TORQUE VALUES (ALL CARS)

NOTE: All specifications are given in ft-lbs unless otherwise noted.			
Fan Shroud Assembly to Radiator - Where Applicable	5-7	Radiator Brace Rod to Radiator Support Where Applicable	20-30 in-lbs
Radiator Shroud Lower Half to Upper Half - Where Applicable	14-20 in-lbs	Radiator to Engine Hose Clamps	1.0-2.5
Upper Support or Fan Guard to Radiator - All Engines	2-4	Transmission Oil Cooler Tubes to Oil Cooler - All Engines	9-12

CQ1047-A

1970 RADIATOR IDENTIFICATION
DOWNFLOW RADIATOR

Service Part Number	Transmission	Description				Vehicle	Engine Displacement (Cubic Inches)	Type Cooling		
		Depth	Height	Width	Fins/in.			Std.	Ext.	A/C
D0DE-A	M	1.27	16.44	17.24	10			X		
C9ZE-AD	A	1.27	16.44	20.24	9	Maverick	170-200	X		
C9ZE-E	M					Maverick,				X
C9ZE-F	A	1.27	16.44	20.24	11	Mustang	200			
C9ZE-A	M	1.27	16.44	20.24	8	Mustang	200	X		
C9ZE-AD	A	1.27	16.44	20.24	9			X		
C8DE-A	M				8			X		
C8DE-D	A	1.27	17.38	20.24	10	Falcon	200	X		
C7OE-G	M									
C7OE-H	A	1.27	17.38	20.24	11				X	X
C9ZE-N	M									
C9ZE-R	A	1.27	16.44	20.24	8	Mustang	250	X		
C9ZE-L	M	1.27	16.44	20.24	13				X	X
C9ZE-M	A									
C9DE-C	M				9					
C9DE-D	A	1.27	17.38	20.24	10	Falcon	302	X		
C9OE-E	M				13					X
C9OE-F	A									
D0ZE-C	M	1.27	16.44	20.24	10	Mustang,	302, 351 (Except 3.5 Rear Axle)	X		
D0ZE-D	A					Cougar				
D0ZE-A	M	1.49	16.0	24.20	10	Mustang, Cougar	302		X	X
D0ZE-B	A									
							351 (3.50:1 Rear Axle)	X		
							351 (Except 3.5 Rear Axle)		X	X
D0ZE-E	M	2.27	16.0	24.24	10	Mustang, Cougar	302 HO	X	X	
C8ZE-L	M				13	Mustang,				
C8ZE-S-M2	A	2.27	16.0	24.24	14, 13	Cougar	428 CJ	X	X	X
C8ZE-L	M	2.27	16.0	24.24	13	Mustang	429 BC	X		

CQ1048-A

CROSSFLOW RADIATORS

Service Part Number	Transmission	Description				Vehicle	Engine Displacement (Cubic Inches)	Type Cooling		
		Depth	Height	Width	Fins/in.			Std.	Ext.	A/C
C9AE-A	M	1.49	17.84	21.70	7 1/2	Ford, Meteor	240	X		X
C9AE-B	A									
C9AE-C	M				9				X	
C9AE-D	A									
D0AE-A	A	1.49	17.80	21.70	7 1/2	Ford, Meteor Fairlane	250, 302, 351	X		
D0AE-B	M									
C9AE-V	M	1.49	17.80	21.70	9	Montego	250, 302		X	X
D0OE-C										
D0OE-D	M	1.49	17.84	26.0	13	Ford, Meteor, Fairlane, Montego	351		X	X
D0OE-E	A				10					
D0OE-D	M	1.49	17.84	26.0	13	Fairlane, Montego	351 (3.5 Rear Axle only)	X		
D0AE-C	M	1.49	17.84	21.7	10	Ford, Meteor, Mercury	390	X		
D0AE-D	A									
C9AE-E	M	1.49	17.84	26.0	9	Ford, Meteor	390, 499		X	X
						Mercury	390, 429 (3.25 Rear Axle)	X		
C9AE-F	A					Fairlane, Montego	429		X	X
C9AE-G	M	1.49	17.84	26.0	12	Ford, Meteor, Mercury	390 (3.25 Axle Only)			X
C9AE-H	A						390 Police	X		X
						Ford	429 (3.25 Axle Only)			X
C9AE-H	A	1.49	17.84	26.0	12	Ford, Mercury	428-4V, 429-2V	X		X
D0OE-F	M	1.49	17.84	26.0	10	Fairlane, Ford, Montego, Mercury	429	X		
D0OE-G	A				9					
D0OE-A	M	2.27	17.84	26.0	9	Fairlane, Montego	429-CJ-BC			
D0OE-B	A						429-CJ	X		X
D0SE-B	A	2.27	17.84	24.5	10	Thunderbird	429			X
						Mark III		X		X
D0SE-C	A	2.27	18.42	24.5	10	Thunderbird	429	X		
D0VE-A	A	2.27	17.80	26.0	10	Lincoln	460	X		X

NOTE: All Service radiators contain an oil cooler unit. It is not necessary to remove oil cooler plugs when the radiator is used with manual transmission. Not all the radiators listed in these charts are available for service. As a general rule, the service replacement radiator is of the air-conditioning and/or extra-cooling type.

CQ1049-A

PART 24-03 *Fan Drive Clutch*

1 DESCRIPTION AND OPERATION

DESCRIPTION

The fan clutch (Figs. 1, 2 and 3) permits use of a powerful fan without paying the penalty of power loss or noise. The fan clutch is a mechanical device which provides maximum air flow through the radiator when required, and a minimum air flow when less than maximum cooling is necessary. It can modulate between the maximum and the minimum air flows according to conditions, and it limits fan speed to a maximum rpm, beyond a given engine input speed.

The viscous fluid shear principle in general is applied to fan clutch design in the following manner:

A drive plate totally enclosed within the clutch housing is attached directly to the clutch input shaft (assembled to the water pump shaft and pulley). A predetermined clearance between the drive plate and the inner surfaces of the clutch housing is established at assembly.

The clutch housing and the fan blade assembly are mounted to the input shaft by a sealed bearing and are free to rotate independently of the drive plate and input shaft.

The interior chamber of the clutch housing is filled with a given amount of silicon base oil. Centrifugal force resulting from the rotation of the clutch, coupled with the constant pumping action designed into the unit forces the silicon base oil evenly about the inner surfaces of the clutch in the close clearance or drive area. The drag between the driving and the driven members is thus increased by the presence of the oil, causing the clutch action.

A control valve (operated by a temperature-sensitive bi-metal coil or strip in the air stream on the front of the clutch) regulates the amount of oil pumped in or out of the close clearance (drive) area. This action determines the fan speed in relation to the drive pulley and the radiator core air flow temperature.

OPERATION

START-UP

At start-up, or after a prolonged engine shut-down period, near maximum fan noise can be heard as the fan clutch fluid is forced into the close clearance area by centrifugal force, resulting in maximum application of the clutch. As the normal operating temperature is reached, the amount of fluid allowed to remain in the close clearance area is regulated by the temperature-sensitive control valve. This determines fan speed in relation to the fan drive pulley and the radiator core air flow temperature.

RUNNING-LOW AMBIENT TEMPERATURE

After the initial start-up cycle has been completed, and as long as the air flowing through the radiator core does not exceed 150-180 degrees F temperature, the fan clutch will re-

FIG. 1—Typical Fan Drive Clutch Installation

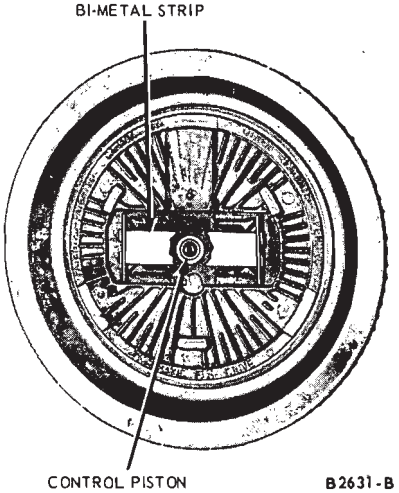

FIG. 2—Fan Drive Clutch With Flat Bi-Metal Spring

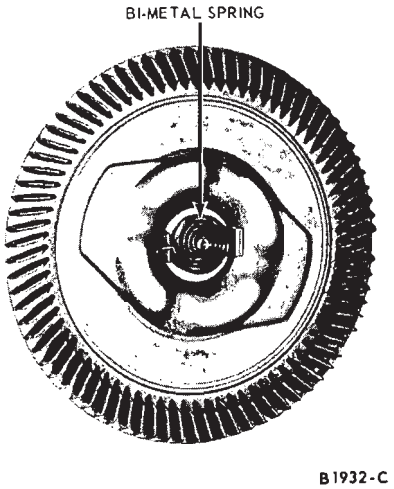

FIG. 3—Fan Drive Clutch With Coil Bi-Metal Spring

main in or near the maximum slip position. During this cycle, the control valve allows a minimum amount of fluid to remain in the close clearance (drive) area.

RUNNING-HIGH AMBIENT TEMPERATURE

As ambient temperatures increase, or air flow temperatures through the core become increasingly higher, additional cooling is required. The bimetal coil or strip senses this change and moves the control valve to the minimum slip position, retaining a maximum amount of oil in the close clearance area.

MODULATING CYCLE

As vehicle operation varies with heavy to light traffic, terrain, etc., the fan clutch operates within the high and low rpm positions, modulating as required as ambient air flow through the radiator core changes.

HIGH SPEED SUSTAINED OPERATION

During high speed operation, fan clutch action will limit speed of the fan to a given maximum rpm. This will occur under hot or cold conditions.

2 REMOVAL AND INSTALLATION

REMOVAL

1. Remove the radiator upper support and/or fan guard.
2. Loosen the fan belt. Remove the capscrews retaining the fan drive clutch to water pump hub (Fig. 1). Remove the fan drive clutch and fan as an assembly.
3. Remove the retaining capscrews and separate the fan from the drive clutch.

INSTALLATION

1. Position the fan on the drive clutch. Install the capscrews.
2. Position the fan drive clutch and fan assembly to the water pump hub (Fig. 1). Install and torque the retaining capscrews evenly and alternately to specifications. Then, check the fan drive clutch flange-to-water pump hub for proper mating. Adjust the fan belt tension to specifications.
3. Install radiator upper support and/or fan guard.

3 SPECIFICATIONS

TORQUE VALUES (ALL CARS)

NOTE: All specifications are given in ft-lbs unless otherwise noted.	
Fan to Fan Clutch (With A/C) - All Engines	10-15

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1970 FAN DRIVE CLUTCH APPLICATION CHART

Vehicle	Engine	Fan Assembly Part No. 8600	Clutch Part No. 8A616	Water Pump Pulley Ratio①	Engine RPM Required To Run Water Pump 2000 RPM①	Fan Test Speed @ 2000 Water Pump RPM	
						Maximum Slip (Cold) ①	Minimum Slip (Hot) ①
Falcon	200	C7GE-A	C30A-C	1.18:	1695	1500	1750
Mustang	250	C7ZE-C	C9ZE-A	1.18:1	1695	1500	1750
Fairlane, Montego	250	C9ZE-C	D0DE-A	1.18:1	1695	1500	1750
Mustang, Cougar	302HO	C9WE-A	C9ZE-D	.95:1	2100	1600	1650
Cougar	351	C9WE-C	C9WE-A	1.31:1	1760	1500	1700
Ford, Mercury,	390	C6ME-A	C9AE-D	1.25:1	1600	1500	1650
Meteor	429	C6ME-A	C9AE-E	1.25:1	1600	1500	1650
Mustang, Cougar	428C,J	C9ZE-E	C9ZE-B	1.25:1	1600	1600	1650
Fairlane, Montego	429	D0SE-A	D0OE-A	1.25:1	1600	1500	1650
	429 B.C.	C9ZE-E	D0OE-B	.96:1	2080	1500	1650
Thunderbird	429	D0SE-A	C9SE-B	1.25:1	1600	1500	1650
Lincoln	460	D0VE-A	C9AE-B	1.25:1	1600	1500	1650
Mark III	460	D0SE-A	C9SE-B	1.25:1	1600	1500	1650

①Approximate

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PART 24-04 *Ford Flex-Blade Fan*

1 DESCRIPTION AND OPERATION

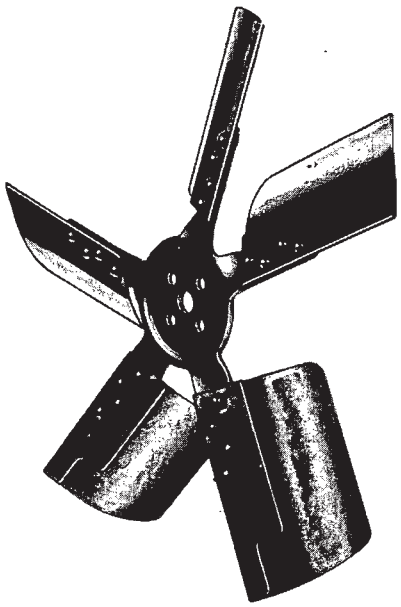

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FIG. 1—Ford Flex-Blade Fan

DESCRIPTION

The Ford Flex Blade Fan (Fig. 1) consists of a spider stamping of either 5-blade or 7-blade configuration, to which are riveted the flexible blade assemblies. Other than the riveted flexible blades, the fan is conventional in appearance and is removed and replaced in the same manner as a standard fan (Part 24-01). It is installed where extra-cooling is required and each Flex-Blade Fan assembly is part of an integrated design which includes the radiator, engine, heater, and air conditioner, if supplied. Refer to the specifications section in this part for engines and vehicles that may use the flex-blade fans with certain cooling packages.

OPERATION

Because the blades flex as engine rpm increase, the Ford Flex-Blade Fan tends to use less power and to generate less noise than does a conventional rigid extra-cooling fan of fixed pitch. In effect, this fan adjusts itself to the engine cooling requirements without the use of complicated variable speed drive mechanisms. No test or adjustment is therefore required, beyond keeping the fan drive belt adjusted to the proper (standard) tension.

2 SPECIFICATIONS

1970 FLEX-BLADE FAN APPLICATION CHART

Vehicle	Engine Option	Cooling Package	Fan Assembly B8600	No. Of Blades	Diameter	Projected Height	Water Pump Pump Ratio
Falcon	302	A/C	C8SE-D	5	17.56	2.4	1.13:1
Fairlane, Montego							
Mustang							
Mustang	351	A/C	C8SE-D	5	17.56	2.4	1.13:1
Mustang	351	Std.	C8SE-D	5	17.56	2.4	.96:1
Cougar	302						
Cougar	351						
Cougar	351	A/C	C8SE-D	5	17.56	2.4	1.13:1
Ford, Mercury	390	Std.	C8SE-B	7	19.5	2.3	.94:1
		A/C					1.25:1
	429	Std.					.96:1
		A/C					1.25:1
Ford, Mercury Police	390	Std., A/C	C8SE-B	7	19.5	2.3	
	428						1.11:1
	429						1.10:1
Fairlane Montego	429CJ	Std.	D0OE-A	7	19	2.3	.96:1
		A/C					1.10:1
	351	A/C	C7AE-D	5	18	2-4	1.13:1
Ford, Meteor	302						
Mustang	428	Std.	D0TA-C	7	18	1.8	.94:with 3.9:1 Axle
Cougar							1.11:1 With 3.5:1 Axle
Mustang	429 BOSS	Std.	D0ZE-A	5	17.56	1.8	.96:1

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